083101001895

DOCUMENT RESUME

ED 452 030 SE 064 483

AUTHOR	Tapia, Ivan, Ed.; Blochmann, Georg, Ed.
TITLE	Environmental Education in Germany: Concepts, History, Projects, Visions.
INSTITUTION	Inter Nationes, Bonn (Germany).
ISSN	ISSN-0177-4212
PUB DATE	2000-00-00
NOTE	33p.; Theme issue. English edition of B&W titled "Education and Science."
AVAILABLE FROM	Inter Nationes e.V., Kennedyallee 91-103, D53175 Bonn, Germany. e-mail: bw@inter-nationes.de; Web site: http://www.inter-nationes.de.
PUB TYPE	Collected Works - Serials (022)
JOURNAL CIT	Bildung und Wissenshaft; n4 2000
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Conservation (Environment); Ecology; *Educational Change; Educational History; Elementary Secondary Education; *Environmental Education; Foreign Countries; Outdoor Education; Vocational Education
IDENTIFIERS	*Germany

ABSTRACT

This document presents the history of environmental education in Germany and reports on the diversions and solutions in the search for sustainable education. Five sections include: (1) "Environmental Education: Learning with All One's Senses"; (2) "Sustainability as the New Model: Knowledge of a New Quality"; (3) "Tomorrow's Education in Yesterday's School: Scope and Limits of Environmental Education in Schools"; (4) "Environmental Education Outside Schools When Nature Becomes a Teacher"; and (5) A Silent Revolution? Visions for a Sustainable Education System". (YDS)

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Concepts

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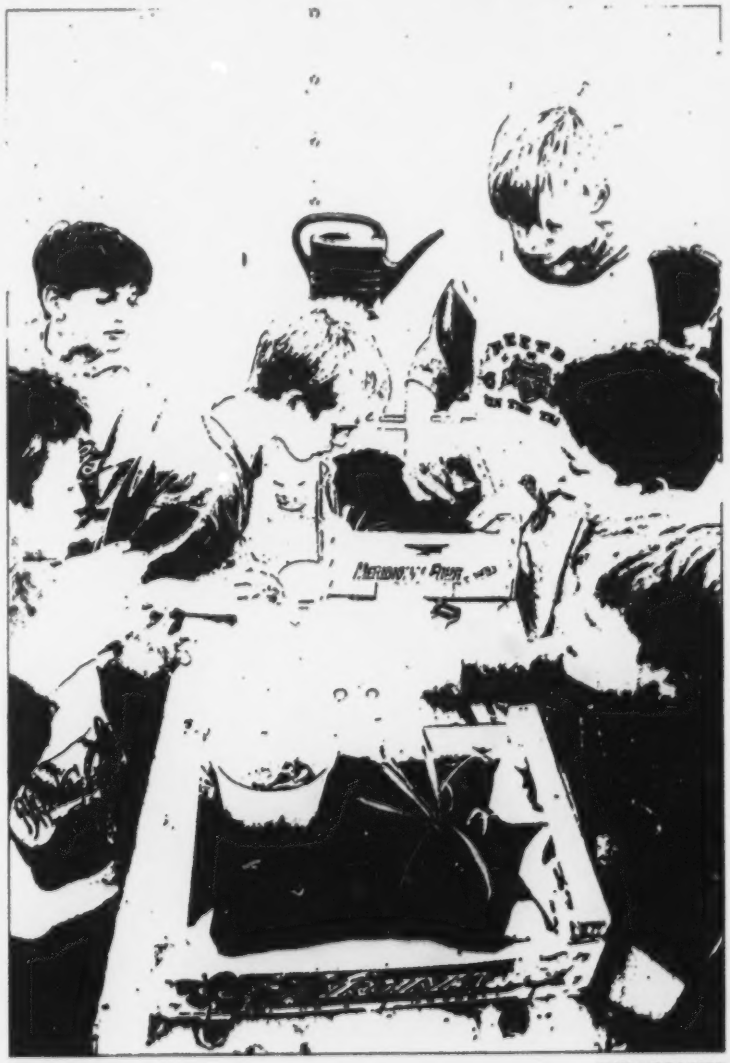
Cover picture: Nature & Culture (Institut für ökologische Forschung und Bildung)

RETYING THE BROKEN THREAD BETWEEN MAN AND NATURE

Geseko von Lüpke

It may appear to anyone looking at Germany from the outside that this country is well ahead of the rest of the world as far as the environment is concerned. Not only that hundreds of thousands of people here are involved in environmental initiatives, the majority of the population carefully separates its waste and Germany is the world's number one with regard to low-resource environmental technology. No, Germany is also the first country in which a dedicated environmental protection party has taken on responsibility in government. Is Germany an environmental paradise?



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Without a doubt, a lot has happened in this country in the last 25 years that benefits the environment and for which future generations can be grateful. But even German environmental protection is still very much in its infancy. The forests are still dying, natural resources are still being used up more quickly than they are being replaced. The waste mountains are growing, many thousands of chemicals are polluting the ground, air and water. We are still producing poisonous radioactive waste that will continue to cause problems for our descendants 250,000 years from now. The major change that is needed to convert our industrial growth society into an ecologically sustainable civilisation is far from complete. On the contrary: we are just starting to introduce it.

The major change that future generations may speak of when they look back to our age will largely take effect on three levels: there are the active environmentalists who repeatedly use imagination and civil disobedience to draw attention to the problems; there are the new laws and environmental guidelines, the energy savings that are made possible thanks to new technologies and recycling. All of them together perform the function of putting the brakes on the worrying destruction of the natural foundations of life and winning time. But these measures are not enough for a fundamental change. Then, secondly, there are the countless initiatives and efforts to understand the social and economic structures that have brought us to a situation where we are consuming the treasures of our planet like the contents of a fridge that can be filled over and over again. Here, the main concern is to regain control over the dynamics of an economic system that is well on the way to gaining victory in the ruin instead of gradually developing sustainable alternatives. But not even this is enough. Because the crux of the change that is needed in the 21st century to conserve the human species in the long term lies in our consciousness: in the way in which we see and use the world, how we fit into natural cycles and understand ourselves as an active part of that ecological system that is in the middle of a life-threatening crisis. All of the challenges are calling out for knowledge that has to be conveyed step by step. Because – as Albert Einstein noted around 70 years ago – we cannot solve the problems of the present with the same ideas that gave us the problems, the knowledge that is needed here must be of a completely new quality. No wonder that ever more educationalists are saying that the environmental crisis is probably the greatest imaginable challenge for our education system. This magazine will describe the history, the approaches, the diversions and solutions in the search for *sustainable education*. But the representation can only have the character of an interim report. Because German environmental education has not yet found the philosopher's stone. But practical experience in this field can help to prevent errors elsewhere and the experience can be used there.

PHOTO: DAVID AUSSERHOFER

LEARNING WITH ALL ONE'S SENSES

Environmental education, eco-education, environmental training, learning from nature – even the plethora of terms illustrates the complexity of the subject. This is not about knowledge that can be handed on via textbooks and conveyed according to a familiar pattern. Environmental education is a versatile experimentation field. It reflects the search for educational responses to a crisis, the dimensions of which have emerged only slowly. Environmental education is made up like a puzzle comprising many independent creative ideas.

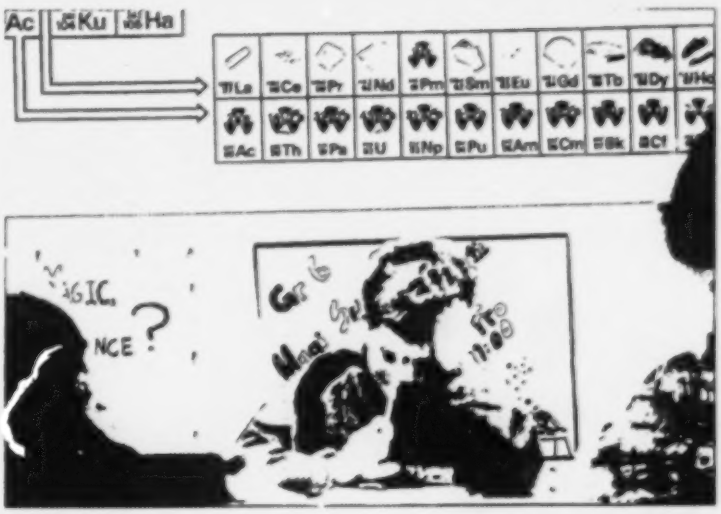


PHOTO: DAVID ALISSERHOFER

He has already started a CD player and the neon tube on the table in the classroom is already starting to flicker, but there are already pearls of sweat on the forehead of the pupil working the exercise bike that has been converted into an electricity generator. When he is supposed to heat a pan of water by one degree and comes to a halt with his tongue hanging out he has learnt what energy is and why we should not waste it. The work of teacher Wilhelm Kirchensteiner, who is already famous in southern Germany, and his "energy case", from which he constantly conjures up new experience games, is an example of what is possible in German classrooms and what it means to "learn with all of one's senses". Anyone who wants to change the behaviour of people who have become rather set in their ways or wants to make the relationship between one's own consumption patterns and the health of the planet tangible needs a fair amount of imagination.

"Environmental protection" – this term has long been part of our everyday life. And "environmental awareness" is as highly regarded as "good behaviour" used to be. But the consequences of the apparent enthusiasm for nature and the environment are poor. We carry on driving our cars happily, break new consumption records each year and continue to head for unlimited growth. While all of this is going on, the hole in the ozone layer continues to grow above our heads, glaciers and the polar ice caps are melting and species of animals and plants are disappearing. Whenever solutions for the urgent ecological problems were being sought in recent years, environmental education was always on the agenda. Whether new waste concepts, the economic use of energy, healthy eating or an ecological change in values: schools – accord-

For experts there is already no doubt that the future generation will live in a seriously damaged environment if there are no fundamental changes.

ing to the simple formula – as the training location for future generations are best suited to weaning people off those faults with which we are destroying the foundations of our lives. An education policy that wants to prepare the pupils of today for the problems of tomorrow already has to create the foundations for something that we today can only imagine as a scenario. Because for the experts even now there is no doubt that future generations will live in a seriously damaged environment if nothing changes fundamentally.

The proof of the pudding will then have to be eaten by the generation that is currently trying out its interactions with the world in crèches and nurseries. Ever more teachers are demanding that we can and must have to imagine the tasks that will face the children of today. "They will have to clean up our polluted rivers and groundwater, they will reafforest our woodlands, they will reduce the misery of the Third World. They will, they will, they will..." says Gerold Becker, Director of the Hesse Institute for Educational Research: "The question is whether what we organise for them in schools will really prepare them for the tasks that they will then have to be up to." And there are reasons for doubt.

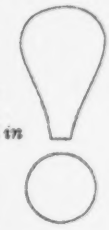
No question: our educational institutions – whether primary schools, general, intermediate or grammar schools – will be faced with tasks whose extent has only become clear in recent times. In view of the expected problems, the schools are facing new responsibilities. But so far the environmental issue has conducted a shadowy existence in the curricula – with just a few exceptions. But education politicians have been talking about ecological education for almost 30 years. As early as 1972 the Conference of Education Ministers decided on a programme of action to promote environmental awareness. But the praiseworthy busyness of the educational bureaucracy hardly took root in everyday school life.

Critics say that environmental education was hardly more than a fig leaf of educational policy.

PHOTO: ETTENSCHMIDT/LAIF/OKAPIA

Because what was being taught in the schools did not meet any demand outside in the world of work. Much rather, the educational system was called upon to continue to qualify young people for the performance society. Ecology remained in the scholarly ivory tower, if it even reached that far. Because the teachers were mostly overtaxed, believes Munich teacher Karl Horst Dyckhoff. "If you order schools to give environmental education, then society as a whole has to make it clear somewhere that it recognises the unusual nature of this order and that it will also give the educational system unusual support." But this was not there, complain all concerned. Almost three decades after its first start environmental education will have to redefine itself. Look back critically, draw conclusions, formulate objectives. Because it has long been clear that it is no longer sufficient to paint a few green splodges on the conventional curriculum. Environmental education has to convey experiences of nature to children in cities in particular and give them ecological insights and it has to explain to them how the world works. "We talk a lot about the fact that species have become extinct, but we forget that relationships have also died out," says Beate Seitz-Weinzierl from the educational section of the BUND nature conservation association: "Many children from the second high-rise generation no longer have a relationship with nature – the threads have been broken."

Ecological teachers are full of stories about children who are frightened of every frog when they are in the countryside or who seriously look for the purple cow called 'Milka' from the TV commercial. The broken thread between man and nature has to be retied. The environmental teachers and the educational planners have not yet reached agreement on how this can be done. Can you simply learn environmental awareness like vocabulary? Is it enough simply to bring together as much knowledge as possible about how the earth, air, water and living creatures are linked together? We are used to the fact that knowledge simply takes effect when we have it. But if anything has been learnt from 30 years of the environmental movement, it is this: we know more than enough about what is good for the environment and what harms it – only our behaviour has not changed very much as a result. Environmental education has had to learn from this that the conventional ways of passing on knowledge are obviously not enough to bring about fundamental changes in behaviour. A relationship with nature can only be recreated in nature itself.



The relationship with nature can only be recreated in nature.

But how much nature is needed to anchor the knowledge that environmental awareness results from

it? If a person's experience of nature is limited to the football field or the patch of green in front of the house and ecosystems are seen on TV at best, then his scale of what is desirable is obviously missing. Only so much is certain: the beauty of nature and the pleasure of experiencing it – educational science talks about primary experience here – achieves far more than books, transparencies and museums. "We need this sensory experience of nature, which is the actual prerequisite for becoming sensitive to living things again," says Beate Seitz-Weinzierl. It is only through contact with nature, games for experiencing nature, work in the open air, experiments, water samples, keeping animals or growing things themselves that people can experience the environment as something enriching and maybe as their *shared world*. A new motivation to acquire knowledge grows out of the feelings. Instead of dry genus and plant names, all the senses are used to experience what something smells like, what it tastes like and what it feels like. Educational science says that knowledge that is experienced is deeper knowledge and: man protects what he treasures.

Man protects what he treasures.

And there is something else: Knowledge about the environment is anything but free of values. Anyone who develops a feeling and knowledge of what is right and wrong with regard to the environment is also called upon to become involved: in class, at school, in his own family, municipality or in the region. Environmental knowledge brings politics into the school and makes the school the germ cell of political action. This is more than unusual for most teachers who have always set great store by strict neutrality. Furthermore, knowledge about the environment is also charged with "non-objective" emotions in a completely different way. Nowadays, most children know that a catastrophe is threatening the modern world unless ecological problems are brought under control.

PHOTO: NATUR & KULTUR

In the early days of environmental education the catastrophe scenarios dominated. Knowledge was almost always conveyed in a lecturing, moralistic tone. Modern eco-education has left those days long behind. But, at the same time, teachers and environmental educationalists must not simply push fear to one side. The essential requirement for ecological action to grow out of environmental education is for the concerns of the young people about a destroyed world to be recognised. "For example, if I feel too much fear, I simply block the absorption of knowledge," says Ulrike Unterbrunner of the Institute for School Didactics at Salzburg University. If the fear is too great, resignation and withdrawal set in as a self-defence mechanism. This task of giving space to fears without causing fears to promote suppression is like squaring the circle. Parents and teachers are called upon here. In view of increasing greenhouse effects and annual hurricanes, children would otherwise consider nature as a threat from which they have to be protected. Only concentrating on the risks and bearing the entire extent of the ecological crisis in lessons is therefore anything but sensible. An isolated lesson unit on the hole in the ozone layer can do more damage than help. Because before the destruction is dealt with, healthy nature has to be experienced.

It is already becoming clear that environmental education occupies a completely different position from the rest of the curriculum. Here, an acute social problem has to be solved. Instead of simply passing on cultural knowledge, as with reading, writing and arithmetic, people will have to think in new directions towards the future. Instead of conveying repeatedly reviewed facts from a safe position, here the teachers have to admit that they themselves often do not know the final solutions for the problem concerned. Instead of conveying knowledge shut off from the rest of the world within the four walls of a classroom, environmental education only makes sense when it goes out into the environment that it is talking about. Environmental education should lead to the learners taking up sides and taking action.

Environmental education should lead to the learners taking up sides and taking action.

So, what is environmental education? Do classical geography lessons fit into this category? Can we talk about environmental education when the chemistry teacher is explaining water analysis, the physics teacher is talking about regenerative energies or German lessons concentrate on the romanticism of nature? Or does environmental education only start when trained nature teachers spend days in the woods with a class? What about the countless adult education centres that are increasingly adopting ecological subjects, the local authorities who are extremely committed to implementing Agenda 21 locally? Is it not also environmental education when apprentices are taught about state-

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of-the-art environmental technology, when students concentrate on new ecological courses or employees are sent on expensive courses to learn that ecological issues now have an impact on all jobs?

Because ecology researches how all forms of life are interconnected it is interdisciplinary, unlike other subjects. Precisely because environmentally sound conduct cannot be limited just to schools, but should increasingly go through society as a whole, environmental education can scarcely be restricted. "How do I deal with a message that says that 60 per cent of trees are sick? What does this do to me? That, too, is environmental education!" says Saman Ansari, physicist and teacher at Odenwald-Schule, Hesse. In order to keep tabs on the sheer unlimited variety of subjects and the range available, environmental education has been divided into two camps without further ado: on the one hand there is *school environmental* education, which can be dealt with in every village, every municipality and town at varying intensities in 32,000 primary, elementary, intermediate, general and grammar schools in all possible subjects – geography, biology, physics, chemistry, German, history, social studies, art, ethics, RE, philosophy or modern languages or it can be made into interdisciplinary projects. And, on the other hand, there is the broad field of *environmental education outside schools*, which encompasses everything offered by environmental initiatives, youth organisations, adult education centres, universities, research institutes, museums, authorities, churches and other free sponsors. Because completely different standards apply here to what is understood by "environmental education", statistical surveys on the status of German environmental education are extremely difficult. Research has reacted to this situation by declaring without further ado "Environmental education is what the people asked think it is".

Data and Facts

If we follow this definition by the *"Forschungsgruppe Umweltbildung"* (Research Group on Environmental Education) at Berlin Free University, then there are 4,600 institutions in Germany that offer events for environmental education outside schools. The figure has risen steadily in the last 15 years and continues to have high growth rates. Around 80,000 people work in these institutions, of whom 10 to 12,000 are mainly involved in environmental education. The researchers noted a clear difference between north and south here: in the northern Federal *Länder* there is on average one environmental education institution per 10,000 inhabitants, in the southern *Länder,* by contrast, only per 30,000 inhabitants. At least, they do exist, we could say.

But this purely statistical value is soon put in context when we remember that environmental education at the 32,000 schools accounts for just 1 per cent of school lessons or just about 1.5 per cent of the subjects on offer at the countless adult education centres. And of the 80,000 people employed in environmental education institutions, only around 14 per cent are primarily involved in environmental education and almost three quarters of those surveyed said that at work they dealt with environmental education only some of the time. This broad range makes it clear that – depending on one's political preference – we can equally draw an enthusiastic or a grim picture of the status of German environmental education.

The fact is that environmental and nature conservation centres, mostly with free sponsorship, take on the lion's share of environmental education outside schools. They are most readily associated with the subject of the environment by the public. Adult education centres, environmental initiatives, museums, authorities or private companies that get involved in environmental education are almost unknown among the public. However, the offers of environmental and nature conservation centres mainly only reach people with high levels of education and people who are already involved in environmental matters at work or interested people who tend to be "green" politically and have a much higher environmental awareness than the average in the population. And, according to the results of the surveys, even among this section of the population, the degree to which institutions offering environmental education are known is low.

Overall, Gerhard de Haan and his research group come to the conclusion that although German environmental education has an impressive potential in terms of figures, in practice it is hardly perceived and reaches only a fraction of the population. In summary it can be said: a lot has happened, but still far too little. This result is a clear contradiction to the importance attached to the subject in politics.

PHOTO RALF BRANDT / GREENPEACE

FROM THE TIMID BEGINNINGS TO AN EDUCATIONAL MODEL

At the start of something new there is usually a crisis. For environmental education, it was the sudden finding in the early 1970s that the carrying capacity of ecological systems is limited. The report of the Club of Rome published by Donella and Dennis Meadows under the title "The Limits of Growth" came as a real bombshell.

Never before had futurologists shown as clearly as in this analysis that the natural foundations of life had been destroyed on a grand scale and warned that the ecological crisis would threaten the existence of the entire modern world and the survival of the human race in the foreseeable future. The report was associated with many, fundamental demands for the redesign of economic activity, production and the recovery of raw materials. Environmental protection suddenly went from being an incidental issue and charged up to the top of political agenda. But unlike most other political problems, for which there were strategies and historical experience, people were faced with new territory here. Because the required innovations were expensive, a heated discussion about the extent of the crisis started among scientists and between researchers, politics and industry. State educational policy was very slow to react to this debate. The environmental programme of the SPD-FDP coalition in 1971 noted for the first time that conveying knowledge related to the environment is necessary in all areas of education and stated that every citizen would have to "take part in shaping and protecting our environment by means of environmentally friendly behaviour". But how this was to happen was still in the lap of the gods. This meant that teachers were given a responsibility that was bound to overtax them to start with: they did not know how the subject should be didactically treated, what learning objectives were to be pursued, how it should be integrated in the timetable, nor were they any textbooks on the subject. Schools and universities were entering completely new territory. And it was to take decades before research and educational planners provided syllabuses and teaching material.

The environmental educationalist Uli Nagel calls this phase in the early 1970s the "first generation of environmental education": all over Europe the first European Nature Conservation Year in 1970s had shifted the previously largely private nature and homeland conservation commitment of educated citizens all over Europe into awareness as a government task. The first United Nations Environment Conference in Stockholm in 1972 not only made the terms "environment" and "environmental protection" into political buzzwords, but the delegates also recommended an international programme on environmental education. These signals were taken up by the Conference of Education Ministers in Germany and formulated into a "Programme of Action to Promote Environmental Awareness". But little happened. The first generation of environmental education built upon the tradition of nature conservation education that had

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already been developed by dedicated natural history and biology teachers at the turn of the century. In the new "environmental protection training" the emphasis was on the classical natural science subjects: chemistry, physics and geography. Although the first textbooks that appeared on the subject of environmental protection dealt with the multi-layered structure of nature with its countless mutual dependencies, they hardly took account of the role of man. Individual teachers started – outside the classical school "hiking days" and viewed sceptically by their head teachers and colleagues – to take their pupils out into nature for field studies. But environmental knowledge and its scientific methodology was at the heart of environmental education; this was mostly conveyed in a warning tone and stressed the responsibility of each individual for his own conduct. This trend was only natural: the people who were to teach these demands brought into schools from outside were the teachers with scientific training. Environmental education therefore tried to disseminate the new material with conventional methods and a good portion of morals.

At universities, too, it became more and more obvious that ecology as the science of the networks in the structure of nature could hardly be understood with the usual reductionism. The new science could not be practised by splitting the world up into many small pieces in order to recognise them. It called for holistic views. System theory was discovered first of all in natural sciences and then also in educational science; it dealt with the hidden rules and relationship patterns in nature and considered and studied the entire biosphere rather as a living organism. In order to do justice to these systems and to calculate the many interlinked global effects of local environmental sins, people started to work with computer simulations. Frederic Vester's books on "interlinked thinking" sold like hot cakes among the first environmental teachers who were looking for new approaches. New words came into environmental education with this work. The buzzwords were: "ecosystem", "life cycle and recycling" or "ecological sustainability". But it would be many years before these terms because the central buzzwords in environmental education. But to date, conveying environment-knowledge – i.e. intense knowledge about the processes in nature – has remained a key focus of environmental education.

During this time, the official compilation of directives on environmental education went its slow, bureaucratic way. In 1980 the Conference of Education Ministers had issued a decision to confirm that environmental education should be introduced as an interdisciplinary principle into both natural sciences and the arts. However, the practitioners on the spot were already ahead of the educational bureaucracy. The "second generation of environmental education" built upon the comprehensive approaches of school reforms that had developed in the second half of the 1970s. For the first time, many state schools had intensively dealt with the achievements of reforming educational science. Whereas the new forms of learning were only used in schools in exceptional cases, the understanding of learning changed slowly. Instead of seeing children as an empty vessel that were to be gradually brought up to be cultural individuals through education,

PHOTO: DAVID AUSSERHOFER

The "first generation"

The start of environmental education was dry and not very exciting. Nature took place mostly within the school walls and mostly comprised display cases in which stuffed animals or pinned butterflies replaced the living world – clean, unmoving and very, very dead. The wonders of nature were demonstrated in a test tube in biology lessons, in physics lessons people started to get to grips with the technical miracle that is a nuclear power station by first of all only explaining how it worked. German lessons bored on about the enthusiastic romanticism of nature. The risks of the chemical pollution of drinking water became part of the dry and dusty drill learning of formulae in chemistry lessons. And even when the global consequences of environmental destruction were discussed in social studies or history, the world that can be experienced with the senses remained outside.

For critical teachers, the material and what they had to convey became ever more of a contradiction. The Hesse physics and chemistry teacher Henning Senske pointed out that the scientific reductionism with which environmental awareness was now to be taught was actually part of the problem that had to be combated here: "Recording measured results, defining terms – exactly what we do in physics lessons – is the same in miniature as when we straighten large streams, concrete over landscapes or makes the world calculable, constant and similar. The pupils really wanted to learn something that I haven't studied: artistic dealings with constantly unique nature."

reform educational science conveyed a completely different picture. This was about seeing the young people as complete beings whose hidden potential was to be gradually brought to light. Instead of cultural shaping by means of specified packages of knowledge, the focus was on the development of the individual. Teachers should no longer solely determine what had to be learned. Much rather, the children were to learn what interested them most according to their own abilities and in a didactically prepared environment. The immediate environment suddenly became the subject of learning. Instead of absorbing knowledge in line with prescribed patterns and reproducing it in line with prescribed criteria, self-determined learning using the subject became increasingly important. Instead of knowledge being passed on theoretically, it could be tried out practically in play and in various contexts. All of this gave completely new impetus to environmental education – even though schools did have initial problems with this approach. Environmental teachers fell upon the new methods of "project teaching" in particular, in which the traditional boundaries of the subjects were removed for a short period so that a complex issue could be dealt with from various points of view. For the first time concepts of "holistic learning" were available. Two key terms came to the fore in this second generation of environmental education. Experience orientation and action orientation.

Progressive teachers and environmental teachers met under these educational buzzwords. Because both were concerned with connecting self-organised, experience-related learning and a tangible result or product, just what should be the result of a project lesson.

But ambitious environmental education outside the school walls is not continuing on a large scale. Although many teaching projects have been successfully realised with great enthusiasm on the part of the pupils and the results could even be monitored in exams according to the classical school model, most educationalists shied away from the additional effort. Growing social problems in state schools and a constantly increasing pressure for performance within an ever shorter period of time led to most teachers turning back to traditional forms of learning.

But this step backwards in environmental education did not stop a minority from continuing along the path that had already been started. In addition to work in the open air, teachers started to redesign schoolyards together with their pupils, to create gardens or to encourage the keeping of pets. But what was always needed was the special commitment of individual teachers who were especially close to the issue and who were prepared to give up some of their free time for environmental education or to expose themselves to the contradiction of coming into conflict with the official curriculum with more ecological education. For this reason, in state schools ecological education was increasingly offered as an additional subject in the afternoons. The less schools showed themselves able to integrate the new demands of successful environmental education in schools, the more the market of supply and demand shifted to independent suppliers. Slowly a new profession as environmental teacher emerged. Thus, in the early 1980s a development started that has continued to this day: independent environmental teachers and ecological educationalists started to offer their skills and

The "second generation"

"Measurements are taken and comparisons made in Nuremburg Zoo. Because small forest detectives and forest reporters are on the road there and are researching nature. They are seeking animal tracks and removing soil samples, working with microscopes and magnifying glasses. The young researchers are pupils from class 3 b of Nuremberg Scharrerschule and are going through the project of the environmental workshop of the environmental education centre." (*Nürnberger Nachrichten* of 5 May 2000). In these interdisciplinary lessons, independent work is to be promoted and the individual learning speed considered. With little work cases, in which the pupils find problems, information and tools, the young children play in the forest, learn how to use wood, a hammer and a file and, just by the way, experience the wood and the meadow with all of their senses.

The pupils of the Municipal Grammar School in Cologne-Porz have brought their wellingtons and have a lot to carry on the way to Wahn Heath, where professional water samples are to be taken today as part of chemistry, geography and social sciences lessons. An entire area of the former military training ground is to be ecologically mapped in order to document the legacy of the military use. On site samples are taken in a test tube and small groups test them for different types of residues. One group takes care of mapping the samples, another the precise documentation. The pupils are very eager because they know that their documentation is being taken seriously. The city's environment department has already expressed its interest.

Two examples of many thousands: the aim of action and experience oriented teaching is to move from theory to practice and from a moral appeal to committed action. Anyone who has discovered the oily residues in drinking water for themselves has a completely different motivation to make sure that they are elminated. And in future he is unlikely to be one of those people who illegally change the oil in their cars somewhere on a woodland path.

knowledge in adult education centres, kindergartens and schools, in accompanying hiking days and class trips, taking over and implementing planning and carrying out ecological project days. Environmental education formally split into two camps that continue to this day: environmental education *in schools* and *outside schools*.

In the latter in particular the reform-oriented path that had been started was blithely followed. In the 1980s new methods of American "outdoor education" reached Europe from the US as a result of research and the publications of Joseph Cornell and Steve van Matre. They were much less concerned with imparting environmental knowledge than with healing the torn relationship between man and nature. Instead of generously seeing man's task as repairing nature where it is broken, these approaches were concerned with healing the sick relationship between man and his own adherence to nature and to change his behaviour as a consequence. So, instead of removing him from nature, it was about reconnecting man to nature, perceiving nature with all the senses, discovering natural wilderness and researching and encouraging one's own "wild" instincts. Completely new learning objectives that were far removed from the concepts and ideas of the Education Ministries came to the fore. Environmental education became education about the world around us.

The separation of man and nature was no longer at the fore, but rather man's identification with nature. This approach had its theoretical foundation in the new philosophical school of "deep ecology". This taught that man is only a thread in the complex fabric of life and nature has a value not just as a result of human use but in its own right. Instead of restricting ecological conduct to improved environmental technology and implementing more stringent limit values and environmental laws, it had the objective of working specifically on the image modern man has of himself and the world. The basic idea of this approach is simple: the more that man experiences nature and understands it as part of himself, the more he will love nature as he loves himself and will be committed to its protection with all of his heart.

In order to allow this radical change in modern man's image of himself, experiments have been conducted with completely new methods. Nature meditations became part of the environmental teachers' skills; attentiveness exercises, silent dialogues with trees, rivers and animals were tested. Many environmental teachers and educationalists – now classed as traditional – viewed these approaches with scepticism. But the results of this highly emotional access to nature were sometimes astonishing. People who had become deeply rooted in the earth in their imaginations and swayed in the wind like trees, adolescents who had listened to life for several hours in the darkness of the nighttime forest, children who had the confidence to enter into silent dialogues with trees, flower or butterflies were deeply affected by this form of natural experience. Speaking *about* nature had become speaking *to* nature.

If environmental education had slightly emerged from its ecological

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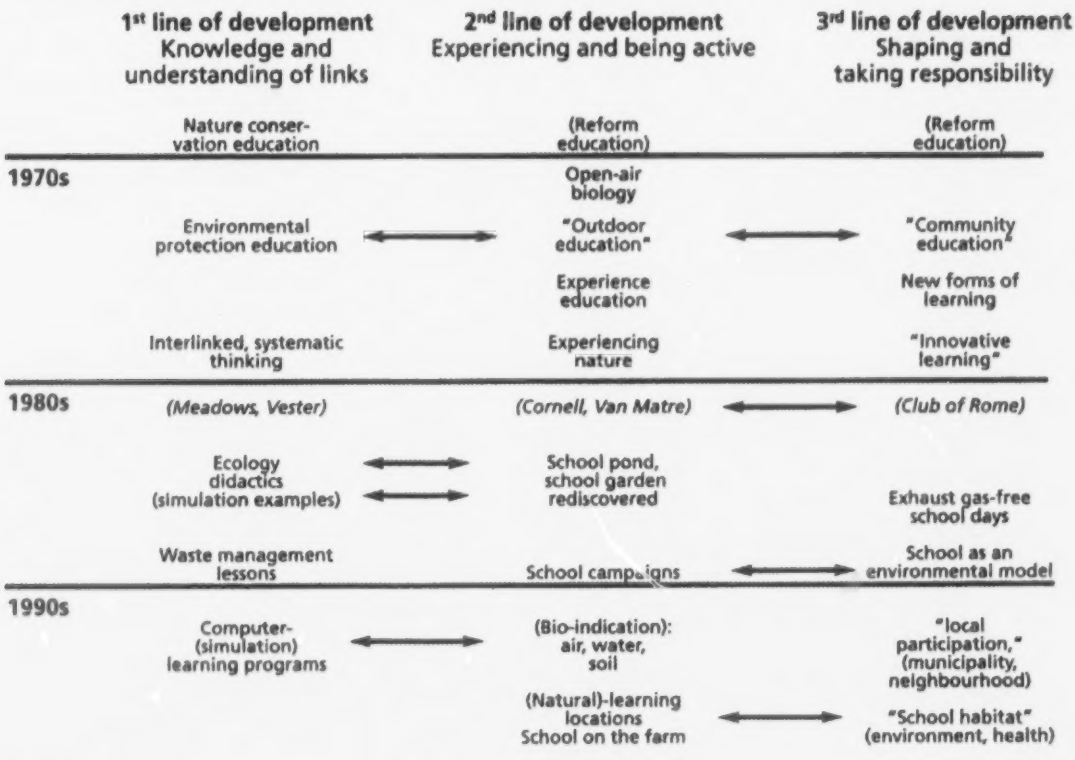
Development in Environmental Education

Over the last 25 years



AUS: ULI HAGEL, UMWELTBILDUNG SLZ, 6/98, S.9

niche philosophically as a result of these new approaches, this trend continued in the 1990s. If environmental education so far had been characterised by harmonising the new subject matter with the demands of the environmental organisations, the start of the "third generation of environmental education" showed that the subject of ecology could hardly be limited and really should include all areas of society. The new discipline burst out of the cramped pigeonhole where it had been placed and increasingly presented itself as a new fundamental scientific paradigm. Research started to talk about "general ecology" or "socio-ecology" and meant that the key to the environmentally sound behaviour of the individual could actually be found in the community, the rules of society and the economic framework conditions. This meant that environmental education, which had previously been restricted to the subject of "healthy nature", became a task and concern for society as a whole and suddenly also affected subjects that had previously been kept separate from environmental education: consumption patterns, social issues, development policy, globalisation and much more. This expansion of ecology also took place at the level of international organisations and their initiatives.

Agenda 21

As early as 1987 the UNESCO Conference in Moscow had drawn up an international plan of action for environmental education in the 1990s and proposed a broad package of measures, which ranged from the integration of environmental education in existing educational institutions right up to public relations in the mass media. However, the most important impetus for the further development of environmental education was given by the major United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992. Because there the statesmen and environment ministers concerned agreed on "Agenda 21", binding under international law, which was nothing less than a catalogue of

environment policies and a plan of action for the 21st century. Although on the one hand, it was concerned with how an equitable balance between the wealthy, highly industrialised north of the world and the developing countries could be achieved, Agenda 21 was also an environment policy document that took up the subjects of the finite nature of resources, the destruction of nature and population growth. For the first time, these two separate ecological and social fields were recognised as factors that could influence each other. This also strengthened the environmental movement's claim to be global in the awareness that environmental pollution does not stop at national borders and environmental protection is not an exclusive concern of the rich industrial nations that can afford it. With the term "sustainable development" the document marked a new cultural guideline for the cultures of the world: in future, economic development was no longer to be realised against nature, but *with* nature. In Chapter 36 of the Agenda adopted in Rio, environmental education gained greatly in importance. The document made it unmistakably clear that the concept of sustainable development should be considered as a new basis for education that is viable for the future and which represents far more than just extended environmental education. According to Agenda 21 education is "indispensable to changing people's attitudes" and is "critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development" as well as for "effective public participation in decision-making". Formally, as a result of Agenda 21 signed by all the heads of government present, the central fundamental motive of environmental education – i.e. bringing about a fundamental ecological shift in awareness – had suddenly been declared the guideline of international educational planning instead of a minority issue. Environmental education had become a government objective that was binding under international law, or even more: from now on all education was really supposed to be environmental education.

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The new appreciation of environmental education as a central task for the future was then increasingly reflected in official positions and reports in the 1990s. In 1994 a report of the Council of Experts for Environmental Affairs said: "All political structural measures have no effect in the long term if they do not also meet the subjective willingness of people to implement and help shape the objectives set". In 1997 the CDU-FDP Federal Government declared that environmental education is an indispensable element of a precautionary policy to protect nature and the environment. In November 1998 the *Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung* [Federal Government-Länder Commission for Education Planning and Research Promotion] published a surprise "Orientation Framework – Education for Sustainable Development", which is currently being further developed at Berlin Free University under the auspices of Gerhard de Haan. At the end of 1999 the Chairman of the Conference of Environment Ministers confirmed that environmental education has the highest standing if society is to move from remedial environmental repairs to preventive environmentalism. Even though the new SPD-Green Federal Government has not yet become a talking point with its own measures for environmental education, the subject still remains on the political agenda.

The "third generation of environmental education" is still in its infancy and no one quite knows how far this most recent product of environmental education will reach. Because "education for sustainability" has countless facets and not all of them have yet been identified. The wider the field that is subsumed under this slogan becomes, the greater the risk that the approach will become so blurred in its vagueness that no one will know what it actually involves. Sustainable education should take place inside and outside schools, not only in the centre of environmental sciences, but should be a component of almost all academic courses of study that concern further vocational training, characterise information to mass media and reach the majority of the population via the adult education centres. This means that the educational planners are thus assigned a completely new task that will keep the education ministries busy for decades to come before it is reflected in universities and schools, not only in curricula but also in everyday life.

Instead of taking school out of society and explaining things separately for each subject, school itself becomes a model for society as a result of such initiatives. In the microcosm of school pupils learn on the spot to successfully change the world and broadcast their find-

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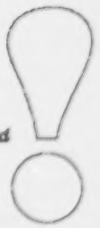
The "third generation"

"Think globally, act locally" are the key words in the Ohm Gymnasium, Erlangen. Anyone who wants to actively support environmental protection has to start with himself, thought the teachers at the grammar school in Franconia and then decided to be the first German school to be receive "EMAS certification" from the environmental authorities. EMAS? To date, there have only been analyses of this kind for large companies that consume enormous quantities of raw materials and energy and produce waste by the skipful. The aim of an EMAS investigation is to seek out ways of saving energy, unused recycling routes and sustainable forms of production from an environmental point of view and then to optimise the entire operation so that there is increased productivity with much lower consumption of natural materials. For a school this means that it has to see itself as a company within the natural cycle for the first time: how much energy is needed to bring the teachers and the pupils to the school, what energy is used to create the optimum learning conditions, how is the heating energy used and where is it being wasted? What is the state of the heat insulation, where is electricity being wasted, what happens with the chemical residues from chemistry lessons and the darkroom, how is waste separated? In the Erlangen grammar school, the idea to start with consistent sustainability within the four walls of the school met with great enthusiasm from teachers of the sciences and the arts. Pupils swarmed over the entire school building like detectives, compiled reports on waste heat, sealed draughty windows, procured energy-saving light bulbs and planned solar installations. Energy controllers paid attention to economical electricity consumption, small groups identified weaknesses, in lessons the actual on-site work was constantly placed in relation to society as a whole. The results were remarkable: The school's waste charges fell from DM 30,000 per year to DM 7,300, the bills for oil, electricity and water fell just as much. But the EMAS certificate is not just a nine-day wonder: in order to keep the certification a new inspection has to be carried out every three years and all weaknesses have to be removed gradually. In March 2000 the Ohm Gymnasium was the first European school to receive its EMAS certificate. The idea has caught on: in an EU project of the Federal Government-*Länder* Commission with funding from the Federal Ministry for Education, Research and Technology, EMAS is now being established in model schools in practically every Federal *Land*.



How are raw materials used in the school community, how much is swapped, cooperated or repaired?

In this context, the slogan "sustainable education" still has countless other aspects that could provide enough subjects for the project work of countless generations of schoolchildren: what is the state of the soils around the school, what transport routes do school supplies need and where do they come from? How does the school and the school community deal with raw materials, how much exchange, cooperation and repair is there? Are there partner schools in the Third World? What initiatives can the school carry out to the municipalities?

This overview of the history of environmental education reflects the astonishing growth of a discipline that started as a tender young plant just 30 years ago and is now in the process of reorganising the entire educational system. But the new tasks that schools will have to face are also meeting with resistance. It is not only teachers who are resisting some of the new tasks that throw into question old habits. Education ministries are also having problems orienting their entire educational ideal to the new guiding principle.

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SUSTAINABILITY AS THE NEW MODEL

Knowledge of a new quality

Hardly any other term is used as often in public speeches by the political elites on ecological issues as "sustainability". At the same time hardly any other political term is used as little in everyday speech as this. Hardly anyone can imagine anything concrete under sustainability.

PHOTO: IFI

In Agenda 21 it says that sustainability would have to "satisfy the needs of the present without risking that future generations will not be able to satisfy their own needs". Not without reason, high-level politics have often been criticised for not doing much other than coining pretty phrases when it comes to environmental education. Without any question, Germany is far from being a sustainable society. However, the value of official recognition lies in the fact that "sustainability" has become a model upon which future economic, legislative and environmental policy will have to be based and against which it can be measured.

"Sustainability is first of all an economic category, because it describes the model of managing natural systems. Secondly, it is a comprehensive, environmental policy category because it has become a model of environmental policy as a whole. Thirdly, it is a social category because sustainable development should also take account of social concerns. Thus, different disciplinary means of access, understandings and orientations have to be harmonised here." *(Politische Ökologie, 12/99).* A look at Agenda 21 is enough to recognise the variety of subjects in educational work that should dedicate themselves to this task: poverty and social justice, consumption; health; building and living; climate and environmental toxins; soil degradation; desertification; agriculture; biotechnology; water and oceans; waste; substance stream management; gender roles; political participation; environmentally sound technologies; international cooperation and much more.

Sustainable environmental education has to fulfil several tasks because ecological consciousness-raising is to allow and encourage more public opinion-formation, political will-formation and social confidence-building in addition to just passing on knowledge. This is calling for no less than enabling the public to participate competently in the social changes needed in environmental policy and the associated public discussion. In a paper published by the Federal Environmental Agency this new task is also linked to clear targets for environmental education. "A change in paradigms is needed here because this is a new problem that cannot be mastered with the old models.

As far as environmental education is concerned, this broad approach runs the risk of trying to catch up with the very general political targets and being condemned to permanent failure in view of the enormous breadth of the subject: never being able to do enough because the problems are overpowering. So, no matter how pleased environmental educationalists were that their subject had moved to the focus of attention, it was also very important not to be instrumentalised by the newly aroused interest of politicians or even allow itself to be misused as an ecological fig leaf that could subsequently be assigned the responsibility for a lack of success. Anyone who understands education to be an instrument also expects it to work as one. Gradually, the recognition took hold that environmental education can only be one factor among many, that it is slow to take effect and, above all, needs a supporting atmosphere in society as a whole in order to be able to develop effectively. Environmental education cannot be manufactured like a product; it only works when the people addressed actively seize the

range offered under their own responsibility and implement them in their daily lives.

Environmental education therefore needs great substantial scope and an identity of its own that is independent of the expectations of the international organisations, NGOs (non-governmental organisations) and education ministries. In 1998 the *"Arbeitsgemeinschaft Natur und Umweltbildung"* (Working Party on Nature and Environmental Education – ANU), a merger of the German environment centres, together with the *"Deutsche Gesellschaft für Umwelterziehung"* (German Society for Environmental Education – DGU) and the *"Gesellschaft für berufliche Umweltbildung"* (Society for Vocational Further Training – GbU) published a paper containing the first reactions to the new challenges. This "Educational Programme for Sustainable Development in the Federal Republic of Germany" proposed, on the one hand, to confidently continue with what is already in place, to carry on from previous environmental education, further professionalise it and anchor it structurally. On the other hand, they said they were prepared to start the further development of the still young discipline under the new focus of sustainable development. It had become clear to the activists, ecological educationalist and operators of environmental centres that the new model required a completely new learning culture. But people started to fight against suddenly overloading the content of environmental education after years of not recognising it.

Environmental education works only if the people addressed actively and responsibly take up the courses offered and implement them in their own environments.

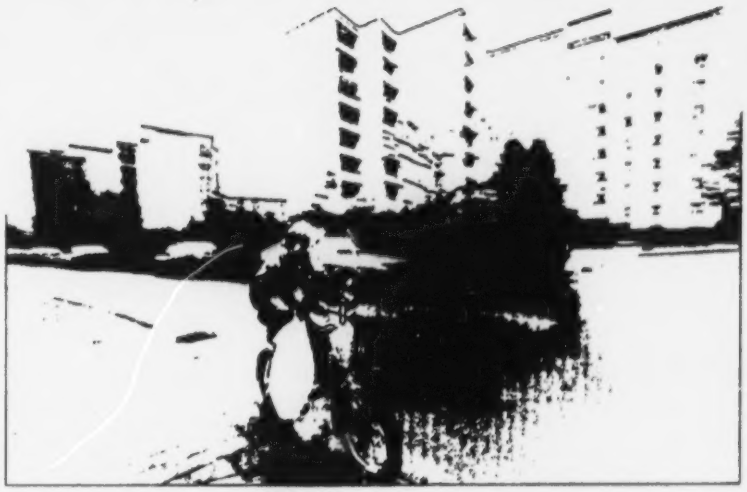
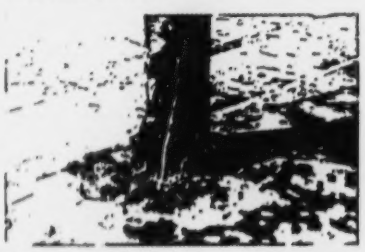


PHOTO: DAVID ASSERCHOFT

From this perspective, environmental education only makes sense if it is understood as *one* contribution to general education in order to reinforce people in their skills for coping with the future. The theoreticians of educational planning and the local practitioners agreed above all that the pure imparting of knowledge in the first generation of environmental education was not in keeping with the times. Education for sustainable development could not be limited to schools and universities; everyone would have to understand it as a "lifelong learning process". That is why it cannot be seen as clearly defined packages of knowledge, but as education that understands itself as a foundation upon which a new world that is viable for the future can be built on its own responsibility. The new learning culture that is to be created for this calls for what the educationalists call "new key skills": communications, planning, networking and problem-solving skills. But these key skills with which a person's own world can be changed, include the skill to critically and vigilantly recognise one's own living conditions and their sustainability and to develop alternatives. At the core, therefore, there must be a new form of perception: instead of fatalistically accepting the world as we perceive it, environmental education must make it clear that we have shaped our world in the way we are accustomed to thinking. A fundamental change in dealings with the natural world around us therefore needs no less than a new culture of perception and new models for thinking.

The more the acceptance of ecological responsibility for the global environment and one's own personal living environment moves to the fore, the more important are learning objectives and methods that go far beyond the first glance and the narrower definition of environmental education.

Anyone who wants to reach wide sectors of the population will, for example, have to consider the diversity of lifestyles and their socio-cultural backgrounds in order to develop appropriate education concepts. Since the model of sustainable development emphasises the unity of ecological, economic and social aspects in social development, a comprehensive educational order of this kind touches upon a large number of different value ideas and cultural patterns. Anyone who wants to permanently influence these patterns and value ideas has to offer extremely differentiated measures. This also includes recognising that there are now a large number of different and sometimes contradictory risk perceptions and evalua-



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tions to such controversial subjects as nuclear technology or biotechnology. Environmental education cannot simply remove this polarisation but it can contribute to the discussion in society being conducted objectively and at a high level.

Gerhard de Haan has introduced the concept of 'design skills' as an objective of environmental education. The most important part of this is its *interdisciplinary nature*. The multi-faceted character of the subject calls for interdisciplinary approaches and varied models of thinking that can be managed only by the cooperation of many scientific disciplines, different cultural traditions and forms of perception. A large part of design skills is *participation*, i.e. enabling people to actively participate in the processes of society. If it does come to action, this does not work without the educational institutions cooperating with themselves and with the authorities and dismantling previous reservations and competition. It is about *building up cooperative structures*.

Since no form of environmental education can approach the full diversity of the subjects at the same time, it needs criteria that facilitate a selection. The issues should have a longer term significance for the social community concerned and, at the same time, typically reflect global problems. So that they do not remain stuck in an ivory tower, they should also be combined with commitment and solidarity and lead to projects in the local Agenda 21 process. According to de Haan design skills therefore comprises the following dimensions: anticipatory thinking, interdisciplinary approaches, networked thinking and the ability for solidarity. Added to this is the skill to think up visionary and utopian concepts. The future always has to be thought up before it can be shaped. The willingness and the courage to promote creativity and imagination is therefore an important task of environmental education. In order to be successful it therefore needs objective ecological knowledge, action skills and the reflection of its own and cultural values. In the interests of sustainability, they should be geared towards the needs of all involved, the conservation and protection of the environment for current and future generations while recognising the economic and social conditions of human life.

Although all of this sounds like squaring the circle, environmental educationalists have declared their willingness to accept the challenges of Agenda 21. In the spring of 2000, 14 German nature and environmental educational institutions came together to form the *"Bundesweiter Arbeitskreis der staatlich getragenen Umweltbildungsstätten"* (Nationwide Working Party of State-Funded Environmental Educational Institutions – BANU) and drew up six "guidelines for nature and environmental education". The new umbrella organisation defines environmental education as "conveying information, methods and values that enable active and responsible people to come to terms with the impact of their actions in the natural, built and social environment and to environmentally sound action as a contribution towards sustainable development". The first of the six guidelines defines environmental education as a "lifelong learning process" through which children, adolescents and adults are to be made capable of participating in all building, planning, nature conservation and environmental protection projects. In the guideline "Environmental education offers visions for sustainable development" the institutions offer their experience and expertise for long-term sustainable development. The fifth guideline, entitled "Environmental education needs partners" calls for a broad network with all groups in society. In the sixth guideline the members of BANU confidently declare "Environmental education offers exemplary environmental educational institutions" and thus refers to 30 years of experience of ecological education that should not be lightly dismissed. Instead of presenting themselves as alternative adult education centres, in future the environmental education centres want to show that they are "professional service companies" that not only provide good public relations, but also skilled work. So there is still quite a lot to do in view of the low recognition factor for the institutions. But BUNA does not shy away from presenting the bill for the new social task of environmental education. "Professionalisation with new targets, contents and tasks" the paper unmistakably says, "can ultimately only be achieved with additional funding." In other words: action must follow the words.

With the **"ANU 2000"** project, in June 2000 the *Arbeitsgemeinschaft Natur- und Umweltbildung e.V.* (Working Party on Nature and Environmental Education) started to advise environmental educational institutions all over Germany with regard to education for sustainability and to qualify them for the new tasks. The central task will be to inform and advise the environmental centres on the spot. This includes researching and publicising exemplary projects from the fields of food and health, fair trade, regenerative energy use and environmentally sound technologies, waste avoidance, codetermination for children and lifestyles that can be adopted by the regional environment centres. With the help of the internet platform *www.anu2000.de* the environment centres are constantly offered up-to-date information. The exchange and the cooperation between the environment centres is made possible through regional and nationwide conferences. At the project's first annual conference in Nettersheim in October 2000 the focus was on the subject of "The experience of nature as an element of education for sustainability". The work also got off to a good start in financial terms: the Federal Environmental Agency will fund the programme for the next three years.

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TOMORROW'S EDUCATION IN YESTERDAY'S SCHOOLS?

Scope and limits of environmental education in schools

The schools that were the central target group for the new discipline in the early days of environmental education 30 years ago are largely divorced from the most recent developments. The dynamic growth of environmental education primarily took place outside schools. This is hardly surprising: because the new models and educational objectives are frequently a direct contradiction of the institutional targets in the form of syllabuses, the separation of subjects, exam pressure and a lack of time to which state schools are subject. Environmental education at schools continues to be the exception. The exemplary projects that are being realised by committed teachers or at specially designated model schools must not hide the fact that the vast majority of schools are far removed from education for sustainability.

The long crocodile wends its way through the wood. 25 blindfold pupils at Berlin's Bertolt Brecht School giggle and stumble over the roots on the path. Always with one hand on the shoulder of the person in front they are forced to put all of their senses in reception mode: feeling the uneven ground with their feet, keeping balance, orienting themselves with their ears and noses. They notice the resinous smell of the pine trees, the wind ruffles their hair, the individual rays of the sun light up their faces for seconds. Somewhere a woodpecker is knocking, a motorised saw can be heard in the distance. In the meantime the crocodile of schoolchildren comes to a halt and the hands feel the bony bark of an oak tree, inquisitively stroke an ivy leaf, smell wild mint and roll on soft moss. When the teacher arrives at the destination of the short trip and asks the children to remove their blindfolds the class is standing in front of a little woodland lake whose water is shining silver in the oblique sunlight. But the thirteen to fourteen year-olds do not want to look at the beauty of the site, and they do not want to hear anything about the woodland ecosystem. It is time to run wild. The teacher has no choice other than to forget his plans and let the children do as they want. And look: some start to investigate the bank themselves, they discover tadpoles, water lilies, fish, a nest in a tree. Others are at a complete loss in the strange world. And the two boys, who the teacher knows to be living in difficult circumstances, have found stones and start to aim them at waterbirds.

"The central reason for the ecological crisis seems to me to be the increasing distance between man and nature," wrote the former Lower Saxony Minister of Education Horrmann in his "Recommendations for Environmental Education": "I believe that school is primarily concerned with imparting values that have to bring back harmony to the disrupted relationship between man and nature." But when city children from Wedding in Berlin experience the forest, an image of the world does not change overnight. Someone who does not receive any attention or love at home, will not give attention and love to birds. Someone who has experienced school as a concrete education facto-

Someone who experiences everyday life where the miserable bits of greenery in the cities are overflowing with cigarette ends and empty cans has no role models, in spite of the best educational intentions.

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ry, loses all control in the woods. Someone who lives in difficult social conditions can be initially intimidated by the wild diversity of the strange natural world. Someone who is shown healthy natural cycles and then experiences everyday life where the miserable bits of greenery in the cities are overflowing with cigarette ends and empty cans has no role models, in spite of the best educational intentions.

Even the highly praised experience education in the fields, woods and meadows cannot make up for what is wrong in society. Environmental education cannot be cut out of the everyday world of children and adolescents, just as little as the ecological issues can be separated from economic and social problems. And, understandably, schools have problems managing all of this while still fulfilling an educational commission that runs counter to the prevailing values of society. "Just because schools are being given a new educational commission it does not mean that the teachers at these schools are ecological pioneers," says the Munich educationalist Karl-Horst Dyckhoff.

Critical educationalists point out that not only are schools overtaxed with the ecological crisis, but the ecological crisis itself indicates an educational crisis: if the way in which we explain the world to the next generation leads to us destroying it more and more, there must be something wrong with education, its contents and values. When environmental education causes friction with the existing conditions, criticism of the ecological crisis quickly becomes well-founded criticism of society. When there are complaints about the disturbed balance of the relationship between man and nature, the modern scientific rationality is also in the dock because it makes an emotional and sensory access to nature difficult. When new values become a learning objective, school itself must not continue to hold on to the old values. But the structure and the content of schools reflect the state of society. What is being asked of them today means making them the vanguard of society. Not without reason, says the Hanover educationalist Albert Ilien: "If the school system wanted to react appropriately to the key social problem of the environmental crisis, it has to change structurally." Until then the schools had no choice other than to use the scope available.

Environmental education in schools thus largely follows three routes that have proved to be effective: on the one hand – as described above – an attempt is made to recreate broken relationships by means of contact with nature. Other educationalists try to have a direct effect on individual lifestyles and on the environmentally friendly design of schools and the local environment by means of environmental education. A third group understands environmental education as political education and tries to investigate current regional environmental problems, to bring them to the public attention, to work out alternatives and to actively bring the issues into the municipality of town council. All of these approaches that have already been tried many times over are – more or less – alien beings in normal school life. The experience of nature emphasises the sensory, experience-oriented, qualitative, exemplary and self-organised learning on the subject, whereas in the rest of the syllabus learning follows a rational, theoretical and demonstrable pattern and is quantitative according to the motto "more is better". The ecological design of schools and the local environment needs interdisciplinary cooperation and the willingness of all teachers, new specialist knowledge and often new funding, whereas everyday life in school is mostly characterised by division, classical teaching contents and scarce resources and interdisciplinary cooperation usually falls down at the hurdle of the tight schedule for overloaded curricula. And political environmental education, which attacks the existing conditions, adopts a critical position and throws traditional values into question, quickly infringes the principle of neutrality, arouses resistance among the authorities and official authorities or is branded as political manipulation. Nevertheless, environmental education in schools constantly experiments with these three educational columns in order to do justice to the task demanded of it. But the framework for action is and remains limited, even if innovative projects at model schools convey a different impression.

In recent years it has emerged that it is precisely the ecological design of schools and the local environment that is easiest to integrate in the structure of traditional educational institutions. The motto of the approach is: "Designing school as a microcosm of society". Instead of making an issue of the ecological immorality of society

PHOTO: DAVID ALEXANDROFF

from a safe position and hidden behind school walls, school itself becomes a biotope in which man and nature should meet each other, reflects the ecological diversity in the cultural diversity of the school and the cooperative interaction of nature can become a model of

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PHOTO: HÄUSER GMBH

teamwork and cooperation in schools. In the model world of schools, children and young people are supposed to try out how the world can be made sustainable through initiative and commitment. And there really are a large number of possibilities when the school head and the school administration play along.

This can include establishing a school garden that can take many years and bring biology lessons alive and make them easier to experience. Practical skills are encouraged, the assumption of responsibilities trained, natural time cycles experienced, the plants that belong together are learned and it is often understood for the first time that a cucumber comes from the ground and not the supermarket. Tree planting campaigns can serve as an example for intergenerational responsibility, the sensitive interaction of ecological cycles becomes clear in small biotopes. Unsealing tarmac schoolyards can make it clear how many animal and plant species return when people are prepared to conserve a habitat for them.

Using the example of school catering, the complex food chains can be understood or the problem of recycling and disposable goods can become just as clear as the advantages and problems of organic cultivation. However, things become interesting for most pupils only when they are given the opportunity to venture onto new territory and really reshape the school creatively. Dealing with the school's own water and the development of innovative forms of waste separation are therefore popular issues. Studying the energy needed for transport from home to school and back can make it clear what energy balance the institution leaves behind outside the school walls. In this context, many schools are experimenting with reducing the energy balance of the school building with the active participation of the pupils. This ranges from analysing the thermal weaknesses and sealing draughty windows right up to installing dimmers and timer switches or energy-saving light bulbs. It can continue in the installation of rainwater utilisation plants or photovoltaic systems on the roof. Exemplary exceptional projects, such as a the vocational school centre in Limburg-Weilburg, Hesse, have even managed, in cooperation with the school sponsors and the Weilburg public utilities, to build its own block-type power station together with the pupils from the disciplines automotive technology, mechanical engineering, heating engineering, gas engineering, electrical engineering and control technology, thus advancing from an energy consumer to a power station operator. But even when the first photovoltaic cells in the municipality are installed on the school roof and the young people adeptly and enthusiastically report their new knowledge at home, something can happen that is otherwise so difficult: the school really can be made the vanguard of society as an ecological model project.

If environmental education were limited just to greening school itself, this approach would be relatively successful. In almost half of schools individual classes are not involved in tidying up and cleaning up work in nature, planting campaigns or stream sponsorships. But it can frequently also be heard that model projects of this kind die down again after the initial euphoria, do not receive any didactic encouragement from the competent ministries or are not further developed due to the lack of specialist time for project work. Research into the impact is not yet clear about how much these internal projects really bring about among the young people or whether they are just consumed in a friendly way as bright spots in grey school life. But most environmental educationalists agree that ecological learning has a greater effect the more the lessons break out of the close confines of classical learning factories and become part of political action. "At the moment where a water investigation is conducted not only as a sandpit game in class, but the results are passed onto the press, for example, there is a new situation," says the Bavarian educationalist Karl-Horst Dyckhoff, who encourages and rewards model projects in schools with his *Tutzinger Umweltstiftung* (Tutzing Environment Foundation). "Where an interest is generated locally, there is a counter power. A teacher who is supported by the public cannot just be called back. He or she has acquired more scope through the quality of his/her action." This means that the third level of political environmental education – unquestionably the most attractive level for schools – is a constant change in direction between active democracy science and political agitation and is certainly exposed to most criticism.

Modern educational science has also coined the term "community education" for this approach. It describes the concept of stepping over the limits of the school terri-

If environmental education were limited just to greening school itself, this approach would be relatively successful.

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tory and becoming actively involved in the concerns of the municipality or region. Here – as already mentioned – it can be about mapping a desired nature conservation area and submitting the documents with applications to the authorities. But local companies can be found guilty of environmental sins as a result of the pupils' ecological detective work – and then they can experience for themselves the power and finesse with which the economically potent polluters defend themselves or get themselves out of a situation. To date, only a few teachers have been prepared to place themselves in the firing line.

Ecological education at school – this much has become clear – needs new contents and forms of being conveyed. "Although knowledge is important," says Ulrike Unterbrunner of the Institute for the Didactics of the Natural Sciences at Salzburg University "for there to be environmentally aware behaviour and action, further dimensions such as feelings, ability to act and values have to be given their place." Because this is not so much knowledge that can be marked, but about perception, establishing contact, empathy or even love, schools have to face up to their limits. "The example of environmental education convincingly shows that school as a pure teaching establishment that conveys knowledge that can be learnt by rote has served its purpose," says the chairman of the Bavarian Association of School Masters and Mistresses Albin Dannhäuser: "Schools have to get away from a narrow understanding of education and really reinforce the philosophy of education."

So what is the position of environmental education in schools today?: new objectives and contents have been brought into schools (e.g. the experience of nature, ecological merchandise technology, knowledge about ecological energy systems, etc.). As a result of the orientation of environmental education towards action, schools have started to open themselves up and cooperate with institutions outside schools. People have started to gear the syllabuses to the new model on a broad basis and to develop new organisational structures. However these positive consequences that affect all schools (and not just model projects) are faced with a large number of inhibiting factors: the dominance of subject-related learning concepts, the inability to loosen rigid structures and well-worn learning methods, the lack of funds, the inadequate training at universities, the insufficient further training and the continued exotic flair of environmental education.

Because it is so difficult to overcome the limits of an institution like a school and, at the same time, be a part of it, in recent years environmental teachers in schools have increasingly sought support from environmental education outside schools, whether through the personal help of trained environmental educationalists on the open market or through conceptual assistance developed for schools by environmental centres, research institutes or individuals. We will hear more about them later.

Program 21 of the Federal Government-Länder Commission

In order to implement the past findings and experience on environmental education in schools in a nationwide school curriculum, the Federal Government-Länder Commission for Educational Planning and the Promotion of Research commissioned Berlin Free University, in cooperation with around 200 schools in fourteen Federal Länder, to compile a concept that has been tried out in practice. The ecological model schools are networked in each Federal Land and, in groups, are incorporated in nationwide networks.

The programme is based on Agenda 21 of the 1992 Rio de Janeiro Environment Conference. The goal of sustainable development with the interaction of environment, industry and social concerns needs school education to be expanded by cooperation with local authorities, business and associations. Educationally, the concept initially aims at integrating the contents and forms of working for *interdisciplinary knowledge* in the syllabuses in order to practise interlinked thinking and to develop the skill of solving complex problems. In the process, participatory *learning* is at the fore in which all groups in society are to be involved in the process of sustainable development. Because schools are supposed to participate in local Agenda 21 processes to shape local communities and regions sustainably, this principle calls for an expansion of the methods and forms of learning in schools. The sustainability debate is to be integrated into school life with a third principle under the buzzword of *innovative structures*. Using energy-saving models, life cycle assessments or by establishing sustainable pupils' companies, ecological structures are to be experienced practically. The programme expressly emphasises the approach of *community education*: municipalities, cities and regions become the school learning field for sustainable development. This is not only thinking about opening schools up to society, but it is also a call for the willingness of the authorities and companies to open themselves up to schoolchildren.

Children and adolescents should help to identify and measure the local indicators of sustainable development and also publicly discuss their visions of the future. For stage II of secondary education the intention is to systematically relate subjects such as politics, social sciences, geography and the natural sciences to each other and to give pupils the possibility for the interdisciplinary analysis and development of complex alternatives. "The aim is," according to project manager Gerhard de Haan, "to give children and teenagers skills to shape sustainable learning and economic activity in the 21st century." By the year 2004 the Federal Government and the *Länder* will spend DM 25 million on this biggest project of its kind. Further information is available in the internet under www.blk21.de.

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WHEN NATURE BECOMES A TEACHER

The Boom in Environmental Education Outside Schools

PHOTO: MAUS & ELSEUR

Along with the social significance that the environmental movement has gained since the 1970s, not only have many traditional institutions undergone an ecological realignment, but increasing numbers of new initiatives for environmental education have been created. To date this has meant that in Germany there is a confusing array of individuals, campaign groups, youth welfare and social work facilities, charitable organisations, consumer groups, companies, research facilities, church groups, museums, authorities, kindergartens, private schools and state environmental centres that all feel obliged to environmental education to a greater or lesser extent. But this very colourful mix of various approaches has proved itself to be fertile ground for new methods and creative ideas, from which environmental education in schools will also benefit in the years to come.

In the first nationwide study on the status of environmental education outside schools the Berlin research group was faced with an almost insoluble problem. Because the term "environmental education" is neither clearly defined, nor protected. Ultimately, it encompasses all efforts that have been made in society to raise general ecological knowledge and to gradually contribute to a change in consciousness. This can include the children's scout group in Eastern Friesland as much as the scientific analysis by the renowned Wuppertal Institute for Environment and Development, a course at the adult education centres given by a dedicated biologist and ornithologist from Starnberg, the packed programme of the Cologne environmental education centre or one of the many state environmental centres throughout Germany. The sheer number of initiatives may give the impression that Germany is undergoing a heady revolution with regard to environmental education. But the fact that these initiatives often comprise a few dedicated people who sometimes gain more publicity than is the due of their roles is often forgotten. The comprehensive portrayal by Berlin Free University, which documented the sector in over 600 pages in 1998, can at least make it clear that environmental education is a highly dynamic market that is undergoing rapid, but uncontrolled, growth.

According to the available data around 70 per cent of the 4,600 environmental education institutions in Germany offer events on the subject areas of nature, nature conservation, agriculture and forestry. In 1997 only around a third of the institutions had addressed Agenda 21 and the associated broad approaches to energy saving, patterns of consumption and questions relating to the quality of life. Most institutions dealt with classical *green* issues of nature research and conventional nature conservation or dealt with experiencing nature and becoming aware of the problems. Courses on environmental technology, economics or environmental law were the exception. However, the increase in this area in particular as a result of Agenda 21 gives rise to the hypothesis that in the recent past there has been a clear differ-

entiation: on the one hand there is still the large number of "traditionalists", on the other hand a highly qualified minority of "modernisers" who are working along the lines of the new model and are a major challenge for the identity of some veterans in environmental education. This conflict between the generations means that the modern approaches to sustainable education also meet with resistance within the sector.

The insufficient number of training institutions for environmental education has helped to make the market so opaque. Because there is no definition for the profession it is very difficult to compile statistics. Someone who is interested in training as an environmental teacher today will meet with no joy at most universities. Environmental educationalists have to train themselves, select specific subject combinations or hope that committed lecturers will occasionally offer seminars on environmental education. For example, in the recently published *Umweltstudienführer* (Guide to Environmental Studies – Ulmer-Verlag, UTB Wissenschaft, Stuttgart 1999) there are over 380 pages filled with environmental studies courses in the field of engineering sciences and natural sciences, but just about 40 pages with environmental studies courses in the field of the social sciences and the arts. And there the emphasis is clearly on environmental management, environmental economics, environmental policy, environmental law, sociological or psychological issues. Environmental education courses, which are mostly still being set up, can more or less be counted on the fingers of one hand. For example, *Potsdam University* offers a postgraduate course in "Environmental Education" and an "Environmental Education Study Module", *Rostock University* has a course entitled "Environment and Education", *Bielefeld Polytechnic* focuses on "Environmental Educational Science" within the context of social education, *Erfurt/Mühlhausen Teacher Training*

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Nature and Wilderness Schools

No fewer than 60 nature schools have opened their doors in the German-speaking world in recent years. They are called *Outdoor Team, Mountain Sport School, Wilderness School, Survival School, Practice Field* and *Forest Runner, Wood Gnome Adventure* or *Wilderness Education*. There may be commercial companies, non-profit organisations or free-market suppliers, who offer their courses in the specialist section of the adult education centres, behind the nature teachers. What they all have in common is their range of direct experiences of nature. The target group is wide: anyone between eight and eighty is welcome. From city children to stressed out managers, from ornithologists to kindergarten teachers who want some further training: there is something for everyone.

This most heterogeneous sector is highly motivated and very productive. Every year reams of new literature on the subject are published, specialist publishing houses are founded, specialist journals have long been established and theoreticians and practitioners of modern nature and experience educational science exchange their findings at regular congresses. A small number of these nature schools has placed an emphasis on the basic and further training of ecological teachers, woodland kindergarten teachers and environmental teachers. The renowned providers of this service include *Naturschule Freiburg, e.V.*, the *Wildnisschule* near St. Gallen and the further training institution of the international organisation Outward Bound. Whereas the latter two concentrate on further developing experience education in theory and in practice, for many years *Naturschule Freiburg* has been training environmental teachers with growing success in detailed and very practice-oriented courses. There is a one-year course to become a nature teacher, in which playful, artistically creative, experience-oriented, meditative and investigative methods are taught just as much as basic knowledge about nature, myths and knowledge about medicinal plants. There is heavy demand for further training courses for kindergarten teachers who want to experience nature with the youngest children in woodland kindergartens where nature is discovered without any toys. Standard schools can ask the *Naturschule* for specialists to help design hiking days. And for children, teenagers and adults there is a wide range of day-long hikes, weekend seminars and free time in which the seasons are experienced, springs thoroughly investigated, fruit trees pruned, bows and arrows built or baskets woven.

In experience-educational institutions such as Outward Bound, the focus is not on environmental education. Here, the challenge of the "wilderness" is used to trigger character-building learning processes among the participants. They work with borderline experiences – abseil down vertical walls, sail through white water in dinghies and bivouac in the mountains in winter. This sector works with environmental education by healing the torn relationship with the natural world using the most intensive experiences of nature. The wilderness schools build upon the attraction of adventure and are thus on the intersection of leisure time fun, natural tourism and environmental education. Whereas pure survival training certainly has little to do with environmental education, its experience-educational approaches are a great challenge for classical and modern environmental education. Because, in contrast to the frequently pedestrian ecological knowledge of schools and traditional environmental centres, experience-educational institutions have fun, excitement and play on their side. Critics accuse this type of 'environmental education' of once again allowing people to experience nature only from the outside or to overcome it only with the help of technical aids in order to confirm their own fantasies of omnipotence. But in addition to the comical manifestations of those wilderness schools where "tough men" have to eat earthworms to survive or fight their way through the forests as though they are living in the Stone Age, there are countless valuable approaches in which participants learn how traditional cultures and our ancestors dealt with nature sustainably and carefully. Environmental education can learn from them because they successfully offer knowledge without a moralistic lecture and convey it through personal experience. Experience education in free nature is therefore without a doubt a part of environmental education. Furthermore, the success of the private wilderness and nature schools can show that environmental education does not necessarily have to depend on public funding, but can also exist on the open market.

University, Primary School Educational Institute, offers an "Environmental Education Course" and *Munich Catholic Foundation University* has an "Environmental and Cultural Education Course" within the context of social education. Only at *Lüneburg University* is there a "Sustainable Education Course" – based on the new model – within the context of teacher training for vocational schools.

That is why most environmental teachers are self-made men in the truest sense of the words. They have chosen environmentally relevant subject combinations off their own bats that qualified them in terms of content, if not didactically. No wonder that, in view of this deficit of academic training scope, a separate market has established itself at private further training institutes.

Together with environmental initiatives and universities, institutions such as *Naturschule Freiburg* are now in the process of

PHOTO: NATUR & KULTUR

developing binding standards for training environmental teachers in order to secure recognition in society for the new profession, to distinguish between serious courses and pure survival adventures and to give the clientele peace of mind about the qualifications of the teachers. Studies on environmental education outside schools have shown that the majority of teachers are extraordinarily highly qualified. But quality can also be a problem. It is difficult for initiatives and associations to finance qualified environmental specialists; the public at large can easily be overtaxed by the specialist knowledge or the courses may only attract people who already know a lot about the subject.

Almost half of environmental educational institutions outside the school sector in Germany are associations, 34 per cent are authorities; only around 5 per cent are independent economic enterprises. In view of the tight public budgets in environmental education there is bound to be a structural change soon. Most institutions, which are largely financed by environmental association or initiatives depend on financing from external sources because they can cover just under half of their costs from their own budgets. On average, an environmental educational institution needs one million deutschmarks, which are mostly made up of donations and funding from foundations in addition to public sector grants. The researchers at Berlin Free University calculated that in the late 1990s environmental education outside schools reached an annual budget of DM 760 million, of which half is accounted for by adult education centres, which also finance all other areas with this money.

Environmental education outside schools is actually addressed to the population as a whole – in line with the upgraded educational commission. However, in practice it has turned out that a large proportion of the work is addressed to teenagers and children because educational research follows the simple motto: the sooner, the better! The basic knowledge conveyed here and the experience of nature clearly differ from the subjects offered to adults. Surveys among participants have shown that the average clientele is very different from the rest of the population. They include a disproportionate number of academics, representatives of environmental professions and people who vote for the Green party. Environmental education institutions have obviously not yet succeeded in reaching broad sectors of the public with their courses and programmes. That is why the umbrella associations are also openly discussing offering two types of environmental education: on the one hand, the experience-oriented, fun return to nature for the vast majority, on the other hand targeted courses for committed and motivated members of the ecological circle who want further education and can then act as multipliers.

Environmental centres in all Federal Länder are starting to offer teachers and kindergarten teachers ready-made concepts that are realised in cooperation.

In this way, environmental education outside schools also increasingly succeeds in introducing its approaches to schools, museums and public institutions. Environmental centres in all of the Federal Länder are starting to offer teachers and kindergarten teachers ready-made concepts that are realised in cooperation.

For example, environmental education further training courses of the *Landesbund für Vogelschutz* (Land Association for the Protection of Birds – LBV) that have been offered for many years in Bavaria at some point naturally led to the development of a transferable overall ecological concept for standard kindergartens and this concept was then implemented in a model project. Unlike in woodland kindergartens, which wander around the woods and do not have a kindergarten building, the LBV kindergarten combines the traditional framework of toys, domestic experience and withdrawal rooms with a comprehensive range of ways to experience nature. For example, the grounds were divided into many niches with hills, shrubs and bushes – these niches not only offer a home to many species, they also provide the children with play areas and withdrawal areas. A fireplace, willow huts, sloping beds and a small biotope make the site into a place that the children can experience and shape in their own way. Instead of spoon-feeding the group with offers, the maxim here is independence and individuality, instead of control and training the objectives are encouragement and accompaniment.

Woodland Education

In the Lauenstein state forest range a woodland rally of a different kind is on the agenda. Instead of noisy machines, groups of schoolchildren are supposed to make observations at seven stations in the forest, test their senses and adeptness, make new discoveries and practise their new skills. On the "stalking path", "throwing pine cones", in the "sawing game" or on the "feeling and smelling path" the children can gather experiences that everyday life at school cannot offer.

In Hohenau in the Bavarian Forest National Park and in Lauenstein in the heights of the Franconian Forest National Park the Bavarian State Forest Administration operates woodland youth hostels with the aim of demonstrating the dependencies between forests, man and the environment. Here, woodland education has developed from the discussion about ecological education; in addition to experiencing nature, this type of education places information about sustainable forest management at the fore. For 42 weeks of the year the institutions mainly take care of school classes and can be booked just like school youth hostels. But Martin Körlin, educational director of the Lauenstein house for six years, does not use the word "school" to describe his institution. "We don't want to be a woodland school, even if that would fit easily into the schools' curricula. For this reason there are no syllabuses, lectures or any other learning methods reminiscent of schools. The teenagers know what school is like all year round, but they do not know the forest in all weathers." Teachers are often surprised to see here that learning processes in nature come about of their own accord and completely new forms of social learning and character development arise if, for once, they are forbidden from using the classical teaching methods.

The environmental education centre of the City of Nuremberg followed a completely different path. Together with the City Council and the local energy supplier, a three-year concept entitled "Saving energy is catching on" was developed. The environmental centre was responsible for educational support, documentation and project management. The municipal structural engineering department helped with the technology, the measurements and the logistics. But the school authorities also made moves by promising, as an incentive, that the schools could have a third of saved energy costs at their own disposal. The 22 Nuremberg schools that took part in the project learnt to use natural resources differently as a result of initiative, creativity and specialist insights into ecological, economic and political contexts. A rap reminding the pupils to switch lights off was recorded for break times and in art lessons "solar shares" were invented and then sold to successfully finance a photovoltaics system. The success of the project, in which DM 321,418 were saved in energy costs, really did catch on: almost all 119 Nuremberg schools will take part in the ten-year follow-on project , "Keep Energy in Mind (KEiM) that was started in 1999.

The "Mips" project developed by the Wuppertal Institute for Environment and Energy for schools and kindergartens has a different focus: Mips stands for "Material Intensity Per Service unit" and is supposed to help the children understand what effort is needed in terms of raw materials and energy in order to manufacture, distribute, consume and dispose of an everyday product. The focus is no longer on the mountains of waste at the end, but the energy required during the entire process. In order to clarify these complex contexts games have been developed that are all about the "ecological rucksack" that every product carries with it invisibly. In the puppet show "Do Jeans Grow on Trees", for example, the children learn that 30 kg nature and [illegible] water are consumed for every 500 g of denim. Buying games with the objective of returning to a light "ecological rucksack" are just as much a part of the programme as the computer game "Mission: Future" and there will soon be an "eco-navigator" which can be used to read off the Mips values when shopping. An accompanying booklet helps teachers (and parents) to use the games independently.

The Hamburg Karlshöhe environmental centre has brought another aspect of sustainable education into schools. While presenting cooking appliances that can be operated with solar energy that the idea of combining environmental education with development policy issues arose. In cooperation with UNESCO seminars on the issue were developed in which teachers, environmental teachers and politicians participated. This led to the idea of founding partnerships between schools in Hamburg and in Chad in order to establish solar cooking workshops and an independent environment centre on the spot. In May 1999 the African environment centre in Chad was ready to start work and since then it has been passing on the vast experience of the Hamburg centre to the working rural population, teachers and engineers. If this cooperation proves itself as an interface between environment and development, this model should catch on by establishing worldwide UNESCO environment centres alongside and associated with UNESCO schools.

So hardly any limits are set on creativity outside schools. And it can be seen over and over again that the schools enthusiastically take up the offers if they no longer have to take care of the logistics, planning and evaluation.

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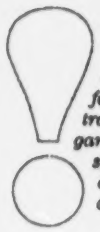
It is repeatedly one of the unbeatable advantages of environmental education outside schools that people can learn directly on the subject in nature without any restrictions. "No second-hand accounts via books, transparencies or museums can compete with that," says Beate Seitz-Weizierl from the educational section of the BUND nature conservation association. Anyone who learns about the world *in* the natural world, learns about the entirety of life of which he is a part. A love of nature can only develop when the formation of emotional values is allowed. Without this opportunity, children learn biology without loving life, young people study law without loving justice or become chemists without having learnt love for the fish in the water, the birds in the air, for the seas or for children. This education of love and empathy repeatedly meets with resistance among many scientifically trained educationalists or is rejected as a romantic transfiguration. However, it proves to be indispensible in environmental education, where the secondary concern is knowledge. Much rather, the focus is on man's relationship with the world.



Such learning processes can be accompanied in the forest by searching for traces, a detective game of identifying species or natural science and mythological tree portraits.

The environmental educationalist Michael Kalff divides the encounter with nature into four levels. First of all, sensory experiences and games are offered, by means of which the habitat can be discovered at one's own speed. This can include attentiveness and relaxation exercises, or group dynamics processes in which natural objects are found, probed and described. On a second level, the traditional and trusted forms of conveying knowledge are integrated by describing ecological connections, knowledge about species, cultural and historical references and natural processes. Such learning processes can be accompanied in the forest by searching for traces, a detective game of identifying species or natural science and mythological tree portraits. The third level of the experience of nature is "intensified, sensory experience" in which the quiet, little and insignificant comes to the fore, in which, for example, nature is discovered with blindfold eyes or by touching or smelling or the multi-faceted beauty of nature is discovered and reflected in one's own artistic self-expression. Michael Kalff calls the fourth level the "meditative encounter with nature" in which the boundary between man and the world is removed in play, in which the participants feel themselves to be very direct parts of nature or where deep identification processes can be triggered. Here, ecological education has turned back to the traditions of indigenous peoples and Buddhism and recommends exercises in which participants retreat to a tree in order to enter into a silent inner dialogue with it.

Although many environmental educationalists and philosophers consider the influence of the church on the destruction of nature to be high ("... and subdue the earth!"), the church's commitment has long been an important factor in environmental education. The nationwide initiatives to "preserve creation" have taken effect as countless local initiatives that are mostly organised just at municipality level. Even the environment commissioners of the major denominations hardly have an overview of the diversity of local schemes. Whereas church environmental education mainly deals with subjects such as environmental protection, social justice and sustainability, they always have an important theological element: in many church environment groups there is no lesser an aim than completely redefining the traditional Christian relationship with the Creation and nature. Although nature was considered to be evil and sinful for many centuries, today it is increasingly represented as a mirror of the divine. Whereas it used to be in line with church teaching to master external nature just like human nature, today the church environmental initiatives of the present proclaim man as a servant and preserver of Creation. It is always a matter of understanding environmental protection as an original Christian commission. Without a doubt this is working on environmental awareness on a broad level, whether in the form of sermons, exhibitions, lectures, meditative dances in nature or other forms of experiencing nature. And in many places discus-

The Effect of Experiencing Nature

A new study by the Institute for Natural Sciences Education at Kiel University proves that for many people their experience of nature is an important basis for their subsequent environmentally aware behavoiur. In a survey of over 1,200 teenagers it could be seen that finding out about animals and plants and intensive experiences of nature with all the senses as well as long-term, practical assistance in nature conservation encourage the tendency towards environmentally aware action in everyday life. According to the study, where environmentally sound action, it is seven times more important to convey experiences of nature than environmental knowledge. The author of the research also proves that the motivation to become involved is around twice as high as a result of experiences of nature than by discussing the threats from the ecological crisis. This seems to provide a scientific basis for the shift in environmental education away from the disaster didactics of the 1980s to the nature experience education of the 1990s. The study described learning in school gardens, environmental working parties or environmental project weeks as approaches almost without a discernible effect on environmental action if they are not accompanied by experiences of nature. "A lack of direct experience of nature," says the author Susanne Bögeholz "takes away from adolescents the possibility to develop their own environmental values on the basis of their own experiences. Consequently, the experience of nature in the context of responsible environmental action is an important element for shaping sustainable development. Even in the light of these results it appears to make sense to offer a reflected, broad repertoire of nature experiences."

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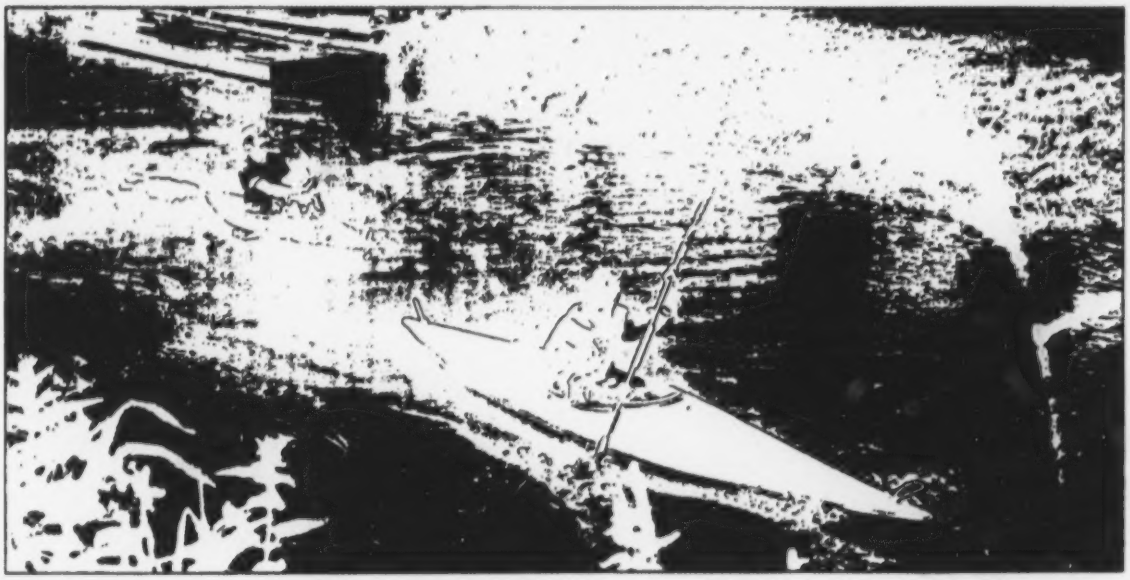
sions about ecology and sustainability are taking place at a high level at church academies.

But church environmental education has also learned from the imaginative campaigns of environmental education centres from the non-school sector and is increasingly bringing new impetus to the work. One example is the music project "creazione unisono" (in harmony with Creation) developed by the "Centre for Environment and Culture" in the Benediktbeuren Monastry near Munich and the environmental station of the Salesian Monastry near Amberg in the Upper Palatinate. The aim of the project is to use music, one of the most popular means of spending leisure time, for environmental education: addressing the subject of man and the environment with music, entering into dialogue with people via music and using lyrics to encourage thought. In April 1998 the initiators announced the idea under motto "Listen" to all 5,000 Bavarian primary, secondary, intermediate and grammar school and called upon individuals or groups to send in songs, lyrics and recordings on the subject of "man and the environment". The reactions ranged from punk to folk, from jazz to classical music. The best compositions were pressed onto CD and published as a book of songs.

The journal *"Politische Ökologie"* (Political Ecology) brought out a special issue on environmental education to report on a windmill project entitled "Wind in Their Sails", which is supported by the Protestant church and combines the traditional tasks of the church with environmental education in an exemplary fashion. The aim of the campaign was to combine the model of "sustainable development" with Christian values, sensory experiences and cultural traditions. This intention was implemented not only be the "wind services" in open nature and many games for experiencing nature, but especially also by the acquisition of donations. At the end of the campaign the initiative was able to build a windmill that produced 800,000 kilowatt hours per year to the value of DM 80,000 – money to finance two environmental advisory posts for many years. However, the initiatives always depend on the personal commitment of individual people. Because church environmental education, too, suffers from the fact that although the importance of the subject is always loudly proclaimed, the financial and logistical support for implementing the objectives is mostly lacking.

Environmental education outside schools as a whole is in a paradoxical situation: on the one hand this sector appears to be growing constantly and developing many new methods and approaches, on the other hand the broad offers of around 460,000 course hours on ecological subjects are hardly perceived by the public. Studies show that in many cases the local people simply have not heard of the providers. The insufficient promotion of environmental education outside schools by the public sector, in turn, seems to be due to the fact that their overall significance is underestimated, even if politicians repeatedly assign it new tasks within the context of 'sustainable development' that can hardly be managed without massive support. The new social significance given to environmental education, on paper at least, is also faced with the insufficient willingness of providers to develop and implement appropriate new forms of work and methods or to coordinate the diversity of different offers of the opaque market. Only the future will show whether the impetus of the most recent past to interlink the institutions and formulate common objectives will be successful.



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Vocational Environmental Education

Today there are hardly any jobs that are no longer confronted with the issues of environmental protection. Whether a biology laboratory assistance, fireman, farmer, chimney sweep or car mechanic – an ecological qualification is required in all jobs. And special environmental technology knowledge frequently determine the employee's deployment and promotion opportunities. In this context, the emphasis of vocational environmental education is not on creating a new relationship to nature, but primarily on technical know-how and environmental management. In a report submitted in 1997 the Federal Environmental Agency drew special attention to ecological innovations in the four areas of energy use, mobility, food production and clothing. At the heart of vocational environmental education are mostly questions relating to energy saving and the sustainable use of raw materials, alternative forms of energy and changing patterns of consumption. Many large companies have developed their own further education options in line with the requirements. The Chambers of Skilled Crafts and professional associations are also active in environmental education. New professions, such as mediator, qualified nature and landscape manager or mobility adviser have also been established. Additional courses have been introduced at many universities – as can be seen in the environmental study guide – and many environment centres offer on-the-job further training courses. Since 1992 the *Institut für Arbeitsmarkt und Berufsforschung* (Institute for the Labour Market and Professional Research – IAB) has published up-to-date information in its brochure "Environmental Protection in Training, Work and Employment" every two years.

In this connection, the implementation of a company EMAS and environmental management are increasingly moving to the fore of further training: if energy use, the consumption of raw materials and recycling are to be implemented in companies in line with the EC EMAS Regulation, this mostly concerns the entire organisational structure and the way companies see themselves. This includes learning offers and new fields for individual members of staff as well as the ability of organisations to learn ecologically as a whole. This is not just about specialised knowledge about environmental technology, but also about the development of new standards for action and objectives and skills in view of the constantly new requirements of *learning to learn*.

A SILENT REVOLUTION?

Visions for a Sustainable Education System

Sustainable development has been declared to be the model of the entire education system. This means that environmental education became the major challenge for educational planning in the 21st century. In spite of numerous good approaches and great dedication, environmental education in the past – especially in the schools – has not yet emerged from its infancy. In the view of many experts this is because the new educational objective is not compatible with the previous structures, contents and methods. It appears that the 'model of sustainable development' can only be implemented when schools are fundamentally reformed at all levels. This means that environmental education may possibly become the lever for radical changes in the entire educational landscape.

In spite of many good approaches and great prospects for the future, environmental education has remained a "one per cent discipline" – as educational planner Gerhard de Haan put it. There are clear deficits everywhere when we look at the pros and cons of environmental education: in environmental education outside school, in companies, in universities and – in particular – in schools. The available potential, a total of 50,000 educational institutions with a total of half a million employees, has so far been used relatively little. Although the number of subjects that deal with environmental issues, has been increased and the quality of the learning processes has been improved. The still insufficient research into effects and environmental awareness however leads to serious doubts as to whether the past approaches in

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school environmental education really make an effect on a broad scale. The sometimes promising model trials have so far not led to a real ecologicalisation of the schools. The scientific-technical approaches dominate problem solving whereas value issues and consciousness-raising play a subordinate role. And so far it has not been possible to use the methods and approaches that have proved to be effective in environmental education outside school in schools because they run counter to the basic values and objectives of the traditional school system.

tion system remains stuck in the hierarchical structures and in the competitive fight for knowledge and performance, at the basis work has been carried out on cooperative forms of education for a long time.

For successful environmental education it is necessary for man to learn to recognise the world in its systematic diversity and interdependence. Furthermore, it is about developing moral maturity, wanting to understand, protect and encourage the value of this diversity and complexity. All of this requires cooperation instead of

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day, that is becoming increasingly fragile and whose future is open. The astrophysicist Hans-Peter Dürr says "We are being given the opportunity to shape the future in a very precise way. This new freedom also leads to new responsibility." In this situation it is irresponsible to "consider the question of the teaching contents in school simply under the aspect of 'how much'" warned Wilhelm Ebert, President of the World Teachers' Association. Instead of making our children strong for the future, we are training them to be higher, better, quicker. The openness of the

PHOTO: DAVID ALEXANDER

The innovation of the education system appears to be overdue. Educationalists and scientists, politicians and industrialists, teachers and professors, parents and pupils are increasingly calling for new forms of learning: learning from practice and nature, learning in contexts and cooperative structures, learning with all one's senses and emotions, learning in self-determined and creative ways, learning without pressure and according to the principle of self-organisation. Although the educa-

competition in the education system, openness instead of limitations, self-development instead of external determination, interdisciplinarity instead of subject boundaries, play instead of performance pressure.

If we follow the explanations of modern science, then we are living in a world that is changing every

future in principle, as conveyed to us by modern science, would turn the education system upside down. Whereas in the past everything was about passing on the total knowledge about a completed creation process as completely as possible, the task is now to reinforce the flexibility and openness in order to get to grips with a changing and ever new world. In this process, environmental education can take a leaf out of nature's book.

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How Does Nature Learn?

Learning in nature is usually done on the basis of a well-developed skill to adapting to changed circumstances: for example, bacteria cultures can also settle in boiling, volcanic springs. Instead of separating itself from the influences of the dynamic world, natural learning therefore comprises integrating and processing changes. "This means that we do not have to teach fixed contents as much as the ability to adapt, the ability to absorb and emphasise new information. We have to practise a new type of dynamic learning. This is not so much a matter of the learning contents, but about learning how to learn", says the evolutionary biologist Friedrich Cramer. The diversity of the natural world did not come about by copying and imitating. Without any romanticism about nature, the inventor of the screen electron microscope and physics Nobel prize winner Gerd Binnig therefore calls for our education system to learn from nature. According to him, it is not like a reproducing machine, but a playing living creature: "This image of the world is not reflected in modern lessons. Schools should reflect what is going on in everyday life. This is not the case. Schools approach the subject less playfully than industry. This is an impossible situation." Natural learning is always learning on the subject and always "holistic" because any other type of learning from nature would not be accepted. Because every living creature in nature has developed in a certain way over a long evolutionary process so that is optimally fitted into this environment, the learning process of each living system takes place in close cooperation with the surroundings in question. Most learning steps of the living creatures in nature take place without teachers according to the principle of trial and error. There is neither a fixed sequence of learning steps nor genetically predetermined syllabuses. Much rather, every living system learns in a self-organised fashion and in harmony with its individual state of development. This self-organised or self-regulated learning takes place in an environment for which the learner was ideally prepared by evolution. Radical educationalists such as Rebecca and Mauricio Wild conclude from this natural process that learning for humans also comprises of allowing natural "living processes" and in a "prepared environment" in order to enable the learning steps to develop by themselves and with self-organisation from the natural development of the individual. With the neurologist and Nobel prize winner Roger Sperry and his brain hemisphere theory it has also been shown that human evolution has resulted in a brain that works by means of the synthesis of ratio, normativity, analysis and logic on the one hand (left half of the brain) and intuition, creativity, synthesis and inner wisdom (right half of the brain). Today's forms of learning concentrated on the left-hand side of the brain accordingly makes use of only half of human potential.

Future and education have always had a problematic relationship with each other because the first front line in the generation conflict goes through schools. A teacher who acquired his knowledge 30 years ago and has not had any further training will become a museum piece in a world that doubles its knowledge every 5 years. Schools are already lagging well behind the needs of the present and have little that is pioneering to offer. We seem to be giving our children the methods with which the world has increasingly slipped out of our control.

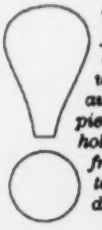
But in the recent past the number of voices in research and theory has increased who consider our ideas of learning to be outdated and want to reshape schools with different forms of learning. At German universities there are no more scientists who represent the old educational concept of receptive learning with learning by rote. "We learn a lot for school but the reference to life, to application outside is not very strong", believes the Munich education Professor Heinz Mandl. "School has already found its meaning in learning." Scientists agree in their analysis: knowledge is passed on without any clear reference. Pupils learn systematically, but never systemically. It is successful receptively and is geared towards short-term drilling. Because what is taught is hardly ever tried out creatively in the problems of practice, educationalists talk about "sluggish learning" that is no longer enough for the demands of the modern age. Furthermore, knowledge that leads to academic careers, but leads away from everyday life.

Mandatory schooling is around 150 years old, so in historical terms it is still a young institution. And for almost as long there has been resistance to hierarchical learning methods, against learning by rote and lifeless factual knowledge. The pioneers called themselves "reform educationalists" who, over 100 years ago, tried to open up the learning factory that is school to life. Reform educational science remains topical although its approaches are used in just a few private schools and even fewer state schools.

With free learning, group work, project work and individual motivation, as proposed by the reform educational movement, the principle of competition no longer applies, hierarchies become meaningless. "Our idea of learning is quite clearly that of 'no knowledge' to 'being informed'," says the Frankfurt educational scientist Horst Rumpf. "But there is another type of learning, which means surrendering to the unknown, feeling, trying, being on the way."

The call for an up-to-date supplement to knowledge and a synthesis of traditional school knowledge and new ways of conveying it transcends all political camps among the experts. Even the former President of the World Teachers' Association Wilhelm Ebert demanded "not only linear, but also interlinked, concentrated teaching in dialogue, drawing attention to contexts, personal sensitivities, partnership and group work, project methods."

Because the reform education movement has over 100 years of experience its approaches are closely examined, updated and often recommended as up-to-date forms of learning in the education faculties of German universities. Because whether the pioneers were called Pestalozzi, Montessori,



This means saying farewell to everyday life at schools and welcoming surprises, away from learning piecemeal towards holistic projects, away from sitting still towards movement, dialogue and play.

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or Steiner, whether they founded many trial schools of their own like Paul Geheeb, Celestine Freineit or Peter Petersen, all of the approaches can be summarised to three fundamental convictions: *independence via learning through experience, learning with all the senses, respect for the individual learning path of each person.*

Each of the reform education schools has interpreted these three pillars in a different way, assigned one or other aspect the leading role in its own theory. Whereas Pestalozzi emphasised learning with heart, hand and brain, Maria Steiner concentrated on the psychology of the child's view of the world, learning by experience, movement and creativity. Whereas Peter Petersen supplemented these approaches by emphasising regular parties and mixed-age learning in fixed groups, men such as Paul Geheeb experimented in school youth hostels with project teaching, pupils' parliaments and the combination of academic and crafts training. Many of these ideas that are almost 100 years old are surprisingly similar to the demands of modern environmental educationalists.

PHOTO: BUNDESBILDSTELLE BONN

Montessori discovered the sensitive phases for different learning levels during growth and developed play materials that the children can learn independently without any pressure for marks. Whereasa Célestine Freineit emphasised self-determined learning, handicrafts via printing methods and the open school, Rudolf Hartmut v. Hentig coined the phrase of "school as a habitat". This means saying farewell to everyday life at schools and welcoming surprises, away from learning piecemeal towards holistic projects, away from sitting still towards movement, dialogue and play. Good teaching is then characterised by the fact that it starts with problems that trouble schoolchildren and society and are important for life. But the main point is that school should be fun, the contradiction between play and work should disappear. A Utopia?

Learning – everyone knows from their own experience – is fun when it comes from inside, when curiosity drives us and the new knowledge adds to our life in very practical ways. This is based on the finding that the person who acts from his very being does not need any education, but "makes himself". Instead of forcing packages of knowledge on them, the teacher's role then is, in line with the development stage of each learner, to offer courses, provide learning environments, do no more then help the pupils to do things for themselves and to be available to answer questions. "Help me to do it myself" is the classical guiding principle of Montessori education.

Innovative education therefore does not have to be reinvented. Proposals and practical experience with holistic learning, sensory experience, promotion of creativity, creative dealings with complexity can be found everywhere in reform education. Environmental education can and will increasingly call upon its experience the more seriously sustainability is taken as an educational model.

Sustainable education needs the spread of the perception of the world's complexity. Anyone who is to understand contexts, must learn to recognise connections. This remains a difficult task provided that school knowledge is divided up like a large cupboard with lots of separate drawers. Exemplary learning seems to be the only possible way of creatively mastering the complexity of the world here. This term allows and promotes learning in interdisciplinary projects and clarifies the diverse links in all specialist knowledge. The counter model is project work where the focus is on one subject and all other subjects are placed in relation to it, where intellectual, crafts and linguistic experience inside and outside schools interact and the 45 minute rhythm of conveying knowledge is broken. If free work and project teaching were to

catch on, this would be like a silent revolution in the education system. Work could be experienced as a partnership, independence would become a guiding principle, routine supplanted by experiment, knowledge would have a concrete reference to action, interest would develop from duty and a school for learning may even become a school for life.

The school of tomorrow must focus on forming characters.

The school of tomorrow must focus on forming characters. Because if knowledge remains without ethics and a view of the whole, we would only be continuing the primacy of the feasible that is increasingly destroying our world. But developing new personalities demands entirely new qualities from the teachers. Instead of someone who knows everything, a partner in the creative process is needed, instead of the sober strategist the player who enjoys the pleasures of life, instead of the cool rationalist the attentive observer of emotional processes among the learners. "Everything that we only record rationally leaves us cold," says the head of the educational section of the BUND nature conservation organisation in Wiesenfelden, Bavaria, Beate Seitz-Weinzierl. "We have to get to this sensory, fun level. Only then will the children also be motivated to act."

Internet Addresses

www.umweltbildung.de
(Arbeitsgemeinschaft Natur- und Umweltbildung)

www.service-umweltbildung.de
(Forschungsgruppe Umweltbildung, FU Berlin)

www.blk21.de
(Planungen zur Umweltbildung der Bund-Länder-Kommission)

www.outwardbound.de
(Methodik und Angebote zur Erlebnispädagogik)

www.dnr.de
(Deutscher Naturschutzring)

www.lbv.de
(Landesbund für Vogelschutz)

www.nabu.de/index.htm
(Naturschutzbund Deutschland e.V.)

www.econet-europe.de
(Europäischer Verband der Umweltzentren)

www.koeln-bonn.net/natur-kultur
(Natur & Kultur - Institut für ökologische Forschung und Bildung)

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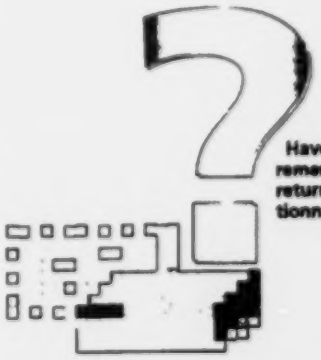

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Imprint
Published by:
Inter Nationes e.V.
Kennedyallee 91 – 103
D-53175 Bonn
E-Mail:
bw@inter-nationes.de
Internet:
http://www.inter-nationes.de
Edited by:
Iván Tapia,
Georg Blochmann
Editorial assistance:
Friederike Baasner
Layout:
Graphicteam Köln
Translation: Janet Barton
Production:
Ilona Orthen
Printed by:
Druckpartner Moser
Druck+Verlag GmbH,
D-53359 Rheinbach
As of:
1 September 2000

Inter Nationes in

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